4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

The primary purpose of an Environmental Assessment (EA) under NEPA is to identify the potential impacts of a major federal action on the environment. This section of the EA is organized to present the potential environmental consequences of the proposed action, which is DOE support for the proposed gas-to-liquids production and demonstration project.

4.1 PROJECT SUMMARY AND SITE LOCATION

The proposed project would comprise the construction of a small gas-to-liquids (GTL) plant to convert natural gas into ultra-clean fuels, primarily near-zero sulfur content diesel fuel, for performance testing in engines and fleet vehicles. The plant would be located on approximately 10 acres of land at the northwest corner of the Tulsa Port of Catoosa Industrial Park, approximately three miles north of Catoosa, Oklahoma. This site in the southeast quadrant of the northeast quarter of Section 6, Township 20 North, Range 14 East, in Rogers County, Oklahoma. Nominally, the plant would produce about 70 barrels per day of clean liquid fuels. Diesel fuel testing would be conducted in engines at existing locations used for automotive research and in bus fleets at the Washington (DC) Metropolitan Area Transit Authority and at Denali National Park.

The proposed plant would generate emissions of criteria pollutants (sulfur and nitrogen oxides, particulate matter, and carbon monoxide), non-methane hydrocarbons, and toxic air pollutants (ammonia, methanol, pentane, and hexane). Emissions totals would be below threshold values for major source classification. The plant would qualify for classification as a minor emission source subject to minor new source review and permitting by the Oklahoma Department of Environmental Quality (ODEQ). Process vapors would be collected and processed through a combustor, which would achieve 98% destruction efficiency.

Water consumption during the 6-month operating period would total 2.2 million gallons, with about 5% consumed as potable water and 95% used for process water. Produced water from the plant would be solids-free but could contain hydrocarbon constituents; this water would be collected and routed through a process water separator system for removal of hydrocarbons. Caustic treatment would also be applied as necessary for pH adjustment, before discharge to the City of Tulsa's water treatment plant.

Over the duration of the proposed project, approximately 434 million standard cubic feet of natural gas would be consumed to produce about 8,800 barrels of ultra-clean diesel fuel and 560 barrels of ultra-clean naphtha. The project would produce about 1.4 million gallons of wastewater and 8,640 cubic feet of non-hazardous solid waste.

The following sections describe the environmental setting of the project area and the potential consequences to the environment that would result from the proposed project.

4.2 GEOLOGY AND SOILS

4.2.1 Affected Environment

4.2.1.1 Site Soils

The major soil type at the proposed 10-acre project location is the Dennis-Bates complex typical of upland prairies, with two to five percent slope. The Soil Survey for Rogers County indicates that 50 percent of the acreage is Dennis silt loam, which consists of deep, dark-colored, well-drained soil that formed under tall prairie grasses in material that weathered from shale and sandstone. The depth of

underlying shale or sandstone ranges from 36 to 60 inches but averages about 50 inches. These soils are susceptible to water erosion unless proper grading and established vegetation exist. About 40 percent of this soil is Bates loam, which consists of deep dark-colored, well-drained soils in the uplands.

4.2.1.2 Site Geology

The proposed project site would be located in the Cherokee Platform geologic province, which occupies most of Osage, Tulsa, Rogers, Washington, Nowata, Craig, Wagoner, Muskogee, Okmulgee, Okfuskee, Creek, Lincoln, Payne, and Pawnee Counties in northeastern and central Oklahoma.

The oldest known rocks in Oklahoma are Precambrian granites and rhyolites; pre-existing rocks were altered, destroyed, or consumed by igneous or metamorphic activity. Heat and fluids given off by the Cambrian magmas changed an older group of sedimentary rocks into metamorphic rocks. Precambrian and Cambrian igneous rocks underlie all of the State and are the floor or "basement" upon which younger rock rest.

Shallow seas covered all of Oklahoma during various parts of the Cambrian, Ordovician, Silurian, and Devonian Periods. Thick limestone and dolomites were the most common rocks of these periods, although several formations of sandstone and shale also occurred. Deposition of sedimentary layers was quite uniform over vast areas of Oklahoma and parts of surrounding states, and thus individual rock formations can easily be recognized and are widespread throughout the southern Midcontinent region.

During the Mississippian and Pennsylvanian Periods, the sedimentary basins of Oklahoma sank much deeper and more rapidly than in earlier periods. Thick sequences of shale, with interbedded sandstone and limestone, were deposited in these basins and in a deep basin that existed in the area of the present Ouachita Mountains. Most major outcrops in the eastern half of Oklahoma are rocks of Mississippian and Pennsylvanian age. Many of the major oil and gas fields in Oklahoma produce from Mississippian marine limestones and sandstones and from Pennsylvanian deltaic or marine sandstones. The proposed project site is underlain by rocks of the Pennsylvanian period, in a regional area characterized by gravel mining from deposits of loose shale.

Following the Pennsylvanian Period, a shallow sea covered western Oklahoma during the Permian Period. The mountains were largely worn down, and sand and mud eroded from land in the eastern half of the State were carried by rivers that flowed westward to the sea. The red color of these Permian sandstones and shales resulted from red iron-oxide compounds deposited with the sand and mud.

Non-marine shales and sandstones characterize the Triassic, Jurassic, and Cretaceous sedimentary rocks of Oklahoma. However, shallow seas covered southern and western Oklahoma during some of the Cretaceous Period, and this resulted in deposition of marine limestone and shale. The Triassic, Jurassic, and Cretaceous Periods comprise the Mesozoic Era, the so-called "Age of the Dinosaurs." Mesozoic rocks in Oklahoma have yielded a number of fine dinosaur fossils; however, these rocks are not characteristic of the proposed project site.

Since the broad, gentle rising of Oklahoma and surrounding areas above sea level at the beginning of the Tertiary Period, no part of the State has been covered by seawater. Oklahoma's land surface sloped downward to the east and southeast, and extensive deposits of Tertiary sand and gravel were washed in by large rivers flowing from the newly formed Rocky Mountains.

The Quaternary Period, embracing the Ice Ages up through the present, is characterized as a time of erosion. Rocks and loose sediment at the land surface were weathered to soil, and the soil particles were carried away to streams and rivers. Hills and mountain areas were worn down, and sediment was carried to the sea or temporarily deposited on the banks and in the bottoms of rivers and lakes.

4.2.1.3 Site Topographical Setting

The proposed GTL plant location is a gradually sloping, irregular tract of land located at the northwest boundary of the Tulsa Port of Catoosa Industrial Park. The area is situated on the broad historical floodplain of Bird Creek and the Verdigris River, below a steep, moderately dissected ridge system to the west. The confluence of Bird Creek and the Verdigris River is approximately two miles southeast of the site. Bird Creek, which trends within 1.5 miles of the area to the southwest, and the Verdigris River represent the closest permanent water sources to the proposed project location. The proposed site is not located in either the 100-year or 500-year flood plains.

The proposed site slopes from an elevation of approximately 625 feet above mean sea level (amsl) on the northwest property boundary to 595 feet amsl at the southeast property boundary. No notable landforms are located within the proposed project boundaries.

4.2.2 Environmental Consequences

The land area to be altered by construction of the proposed GTL plant would include most of the 10-acre site. Erosion control during construction would be necessary due to the size of the project and soils to be disturbed. Erosion control measures would be constructed or placed in accordance with an approved Stormwater Pollution Prevention Plan for Construction Activities.

The proposed plant would not affect geology, soils, or topography. Topography within the area is generally flat to rolling and would be maintained after construction. Subsurface geology would not be affected. The greatest degree of impact from the proposed project would be to soils and would occur during construction. Following construction and during operation, the proposed project site would be covered by concrete in material storage and reactor areas, therefore minimizing the potential impacts from spills, traffic, or other activities.

4.3 SITE INFRASTRUCTURE

4.3.1 Affected Environment

The proposed plant site is bordered on the west and northwest by State Highway 266, a two-lane highway that connects the cities of Catoosa and Claremore.

Located along the west and northwest property lines is a raw water main that supplies the City of Tulsa from Lake Eucha, in northeastern Oklahoma. A 16-inch natural gas supply pipeline serves the Port. The high-pressure gas line is located along the highway and the west/northwest property line.

A railroad line borders the property to the east and southeast. The Tulsa Port of Catoosa operates this line and two locomotives for rail connection to major carriers.

Dual-feed electric service is available at the Port, to serve the needs of each leased site. A high-voltage overhead electrical line runs along the east and southeast property line.

Water supply and wastewater services are available from the City of Tulsa. A service road along the City of Tulsa raw water line currently provides access to the site. This service road connects to an asphalt-paved road near the north entrance to the Port, approximately one-quarter mile east of the proposed plant location.

4.3.2 Environmental Consequences

4.3.2.1 Tulsa Port of Catoosa Site

The existing service road along the raw water line would be paved to provide permanent site access. Traffic to and from the plant would proceed by this planned road improvement. The site would employ 24 persons scheduled over three shifts. Employees would use existing roads within the Port prior to the access road. No other transportation improvements, such as road expansions, turn lanes or traffic signals, would be required for the plant. Increases to traffic by the 24 employees would have negligible affect on the existing infrastructure at the Port, which serves 2,600 existing employees.

Construction of the proposed plant would require on-site transportation of hydrogen and nitrogen gas as well as water treatment chemicals and caustic. Additional materials for the proposed plant would consist of natural gas, which would be obtained from an existing, nearby pipeline, and water, which would be available at the site from the City of Tulsa's existing potable water pipeline. The indicated materials would be consumed in the process, disposed through process wastewater, or eliminated through a flare.

Products to be transported off-site would consist of synthetic fuels, both diesel and naphtha, as well as waste materials, including trash. The proposed project would produce (nominally) 70 barrels per day (bpd), or about 2,940 gallons per day (gpd), of synthetic fuels. Solid waste materials would be transported from the site using existing, licensed waste haulers, possibly transporters that provide service for comparable industrial tenants at the Port. Off-site transportation of synthetic fuels would be accomplished using approved containers. Transportation of the final product and project wastes would be performed in accordance with all applicable state and Federal regulations and requirements.

No new rail connections would be required for the proposed project. Neither new gas or water pipelines nor electrical transmission lines would be required.

4.3.2.2 WMATA and Denali National Park Sites

Infrastructure requirements for storage and dispensing ultra-clean, GTL diesel fuel would consist of an additional fuel tank at each site. At Landover, MD, WMATA owns an existing, extra 4,000-gallon tank that would be used for supporting the proposed fleet vehicle tests. At Denali National Park and Preserve, the National Park Service operates a bus fueling area near the entrance to the Park. A fuel storage tank (6,000-gallon capacity) to hold the GTL diesel would be located temporarily on previously disturbed land near the existing diesel tanks in the bus fueling area. This area is not visible to the public traveling into Denali National Park, although the tank area is visible from Park trails near the entrance. The tank would be mounted on skids for ease of removal following completion of the demonstration project.

Fuel handling of the GTL diesel used for bus tests and conventional diesel fuels in the two bus fleets would be identical.

4.4 AESTHETICS AND VISUAL RESOURCES

4.4.1 Affected Environment

Visual resources at the proposed plant site are defined by the surrounding industrial landscape to the northeast, east and southeast, a highway to the west, and a steep ridge to the west, which essentially blocks all other views. The visual characteristics of vegetation within the proposed project area can be described as woodlands with forbs and grasses along the perimeter clearings.

The existing landscape within the proposed plant area has moderate visual quality based on vividness, intactness, and unity attributes. The landscape components have no unique characteristics that convey visual excellence or rare contributions to scenic value in the State of Oklahoma or the region.

4.4.2 Environmental Consequences

Visual resources at the site are substantially defined by the existing, industrial landscape and transportation infrastructure. Lighting for facilities at the proposed plant site would not be an issue due to lighting use by the nearby industrial facilities.

Vegetation, including trees, would be cleared from the site. However, trees located on the public side of the site would be maintained to the maximum extent possible. Industrial development of the site for installation of the GTL plant would result in the installation of gas processing equipment, synthetic oil treatment equipment, and storage facilities for process feed materials and products. Storage tanks ranging in size up to 25-ft diameter and 19-ft height, steel structures for containing process units, exhaust stacks ranging in height from 20 ft to 50 ft, and other process structures and employee areas would be installed. These types of structures would be consistent in type with facilities installed by other industrial tenants at the Industrial Park, such as those existing facilities for agricultural product and petroleum product storage, gas purification, manufacture of specialty chemicals, and metal fabrication for drilling rigs and process equipment.

At the two bus fueling areas, no vegetation would need to be removed for installation of the GTL diesel holding tanks. No change in visual quality would be expected from the additional tank used for GTL diesel fuel at either WMATA or Denali National Park.

4.5 AIR RESOURCES

Air resources refer to the existing climatic and meteorological conditions and concentrations of various pollutants that influence air quality.

4.5.1 Affected Environment

4.5.1.1 Climatic and Meteorological Conditions

At latitude 36 degrees north, Tulsa, Oklahoma, is sufficiently north to escape long periods of heat in summer, yet far enough south to miss the extreme cold of winter. The influence of warm moist air from the Gulf of Mexico is often noted, due to the high humidity, but the climate is essentially continental, characterized by rapid changes in temperature. Generally, the winter months are mild. Temperatures occasionally fall below freezing but only for a very short time. Temperatures of 100°F or higher are often experienced from late July to early September but are usually accompanied by low relative humidity and a southerly breeze. The fall season is long with a great number of pleasant, sunny days and cool nights.

The average annual rainfall is 37 inches, including about 8 inches of snow. Precipitation is ample for most agricultural pursuits and is distributed favorably throughout the year. Spring is the wettest season, providing an abundance of rain in the form of showers and thunderstorms. The steady rains of fall are a contrast to the spring and summer showers and provide a good supply of moisture and more ideal conditions for the growth of winter grains and pastures. The greatest amounts of snow are received in January and early March. Snow is usually light and only remains on the ground for brief periods.

The date of the last 32°F temperature typically occurs in late March, and the date of the first 32°F occurrence is normally in early November. The average growing season is 216 days.

The Tulsa area is occasionally subjected to large hail and violent windstorms that occur mostly during the spring and early summer, although occurrences have been noted throughout the year. Prevailing surface winds are southerly during most of the year. Heavy fogs are infrequent and sunshine is abundant.

4.5.1.2 Air Quality

The National Ambient Air Quality Standards (NAAQS) established by the U.S. Environmental Protection Agency (EPA), and Oklahoma Ambient Air Quality Standards, define the allowable concentration of criteria pollutants that may be reached but not exceeded in a given time period. These air quality standards were established to protect human health (primary standard) and welfare (secondary standard) with a reasonable margin of safety. The criteria pollutant standards include maximum concentrations for ozone (O_3), carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), lead, and particulate matter with a diameter of 10 microns or less (PM_{10}). Ozone is formed by the photooxidation of reactive hydrocarbons in the presence of nitrogen oxides. Emissions of volatile organic compounds (VOCs) that participate in atmospheric photochemical reactions also result in ozone formation.

All counties in Oklahoma are in attainment status and comply with the NAAQS. The quantity of each criteria pollutant emitted by the proposed plant would be less than 100 tons per year (tpy), and less than 10 tpy of any one Hazardous Air Pollutant (HAP), or 25 tpy of total HAPs, would be emitted. Since these emission rates are the thresholds requiring designation of a facility as a major emission source, Syntroleum Corporation submitted a minor source air construction permit application to the Oklahoma Department of Environmental Quality (ODEQ) on April 9, 2001. Construction permit 2001-006-C was issued by ODEQ on July 2, 2001.

At Denali National Park, air quality monitoring information indicates that the air is among the cleanest of any location in the United States.

4.5.2 Environmental Consequences

The proposed plant was permitted by ODEQ as a minor source facility and would be operated in compliance with all state and Federal air regulations. A process vapor combustor would control process vent (i.e., VOC) emissions at a destruction efficiency rate of 98%. The proposed plant would not present potential for adverse impacts on air quality, except for potential short-term impacts at the site during plant construction.

The proposed plant would contain six combustion sources, as shown in Table 4-1.

Table 4-1. GTL Plant Combustion Sources

NO.	SOURCE	HEAT INPUT (MM BTU/HR)	EXHAUST STACK	
			HEIGHT, FT	DIAMETER, FT
1	Air Heater	1.11	25	1.06
2	Gas Heater	0.05	25	0.9
3	Gas Heater	1.62	30	1.16
4	Startup Boiler	5.0	30	1.16
5	Gas Turbine	20.96	20	2.0
6	Vapor Combustor	26.24	50	8.0

In accordance with the approved Permit to Construct (No. 2001-006-C) issued by the ODEQ, the facility heaters, boilers, and turbine would be fueled with only commercial natural gas. Records of natural gas consumption by all combustion sources would be maintained on a monthly and cumulative 12-month, rolling basis.

Emission estimates for criteria pollutants from the boiler and heaters were determined from EPA's compilation of air emission factors (AP-42) – Table 1.4-1, Emission Factors for Nitrogen Oxides and Carbon Monoxide from Natural Gas Combustion, and Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion – based on a heating value for natural gas of 1,000 Btu per standard cubic feet (SCF).

Emission estimates for criteria pollutant discharges from the gas turbine were determined using AP-42 – Table 3.1-1, Emission Factors for Nitrogen Oxides and Carbon Monoxide from Stationary Gas Turbines, and Table 3.1-2a, Emission Factors for Criteria Pollutants and Greenhouse Gases from Stationary Gas Turbines. Emission estimates for vapor combustion were determined using AP-42 – Table 13.5-1, Emission Factors for Flare Operations. Table 4-2 presents the emission factors used to calculate pollutant discharges from the combustion sources.

Table 4-2. Emission Factors used for Plant Combustion Sources

COMBUSTION SOURCE	EMISSION FACTOR (LB PER MM SCF)					
	PM_{10}	SO_2	NO_x	CO	VOC	CO_2
Boiler and Heaters	7.6	0.6	100	84	5.5	120,000
Gas Turbine	6.6	0.6	320	82	2.1	110,000
Vapor Combustor	0	-	68	370	140*	**

* Total Hydrocarbons. To determine VOC emissions, methane content (55%) would be excluded, since methane is exempt from regulation as VOC due to its very low photochemical reactivity. Reactive hydrocarbons would thus constitute 45% of these emissions, or an emission factor of 63 LB per MM SCF.

** No value provided.

The emission rate for sulfur dioxide would be low, since the commercial natural gas mandated for use as fuel contains very low concentrations of sulfur. Typically, the content of sulfur in pipeline quality natural gas is 2,000 grains per MM SCF, or 0.285 lb sulfur per MM SCF. Assuming 100% combustion, the sulfur dioxide emission rate for natural gas combustion would be about 0.6 lb per MM SCF.

The vapor combustor would be equipped with a steam injector or an alternate mixing system (e.g., forced air or water spray) to ensure sufficiently high combustion efficiency for avoiding smoke formation.

Combining the emission factor information from Table 4-2 with the fuel consumption rates specified for the combustion sources in Table 4-1, the projected emission rates for criteria pollutants from combustion sources in the proposed plant are shown in Table 4-3. These emission rates would be incorporated into the permit for the plant.

Table 4-3. Emission Rates from Combustion Sources

NO.	SOURCE	PM_{10}		NO_x		CO		SO_2		VOC	
		LB/HR	TPY	LB/HR	TPY	LB/HR	TPY	LB/HR	TPY	LB/HR	TPY
1	Air Heater	0.01	0.04	0.11	0.49	0.09	0.41	<0.01	<0.01	0.01	0.03
2	Gas Heater	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
3	Gas Heater	0.01	0.05	0.16	0.71	0.14	0.60	<0.01	<0.01	0.01	0.04
4	Startup Boiler	0.04	0.17	0.50	2.19	0.42	1.84	<0.01	0.01	0.03	0.12
5	Gas Turbine	0.16	0.69	7.60	33.29	1.95	8.53	0.01	0.02	0.05	0.22
6	Vapor Combustor	0	0	1.78	7.82	9.71	42.52	0	0	1.65	7.24
TOTAL		0.22	0.95	8.48	44.52	12.3	53.91	0.01	0.04	1.75	7.65

The gas turbine (combustion source 5) would be subject to EPA standards for new combustion sources. Performance testing of the gas turbine would be required within 60 days following achievement of maximum production rate for the gas-to-liquids plant, but not later than 180 days following initial startup.

Using the carbon dioxide (CO_2) emission factors from Table 4-2 for the heaters, boiler, and turbine, the CO_2 emission rate would be about 4,100 tpy from the heaters and boiler and 10,100 tpy from the turbine. If all gas combusted in the vapor combustor resulted in a CO_2 emission rate comparable to that from the heaters and boiler, the CO_2 emission rate from the vapor combustor would be 13,800 tpy. At this rate, the total CO_2 emissions from all combustion sources would be 28,000 tpy.

While not regulated as an atmospheric pollutant, carbon dioxide is a greenhouse gas. The current and historical effects of CO_2 levels in the atmosphere remain a topic of scientific debate, but consensus exists that large increases (i.e., doubling) of atmospheric CO_2 concentrations from the current level of about 365 ppm would create a variety of serious environmental consequences, including increases in global average temperatures, with resulting changes in weather patterns, accelerated rise in sea level, etc.

Currently, global emissions of CO_2 exceed 7.5 billion tons per year. The projected CO_2 emissions from the GTL plant's combustion sources would be less than 0.00037% of present global emissions.

Fugitive emissions of VOCs would be expected from storage tanks and from leaks in hardware components (e.g., valves, seals, flanges, etc.) used in the gas processing plant. Estimates of VOC emissions from the storage tanks were determined using information from Section 7.1 (Organic Liquid Storage Tanks) of EPA's Compilation of Air Pollutant Emission Factors, AP-42. The emission levels were developed using TANKS software, which is a computer program used commercially to estimate VOC and hazardous air pollutant emissions from storage tanks. This software is commonly used by Federal, state, and local agencies and others to calculate air pollutant emissions from organic liquid storage tanks.

The projected VOC emissions rates for the eleven storage tanks are presented in Table 4-4. Since the vapor pressure (i.e., measure of the tendency of a liquid or solid to form gaseous molecules) of naphtha (11.04 psia) is substantially greater than the vapor pressure of diesel fuel (0.04 psia), the VOC emissions from naphtha storage tanks would be much greater than those from the diesel tanks. To minimize formation of hydrocarbon vapors, and for compliance with regulations covering storage tanks, each naphtha tank (Numbers 1,2, 5, 6, and 7) would be filled from the bottom.

Table 4-4. Emissions of VOCs from Storage Tanks

TANK NO.	CONTENTS	CAPACITY (GALLONS)	OPERATING LIMIT (BARRELS/YEAR)	VOC EMISSIONS	
				LB/HR	TPY
1	Naphtha	2,520	1,323	0.17	0.75
2	Naphtha	2,520	1,323	0.17	0.75
3	Diesel	10,080	23,519	<0.01	0.01
4	Diesel	10,080	23,519	<0.01	0.01
5	Naphtha	18,900	1,323	0.41	1.80
6	Naphtha	18,900	1,323	0.41	1.80
7	Naphtha	18,900	746	0.38	1.65
8	Re-Run	21,000	4,477	<0.01	0.02
9	C10+	21,000	50,753	0.02	0.07
10	Diesel	69,300	23,519	0.01	0.04
11	Diesel	69,300	23,519	0.01	0.04
Total VOC Emission Rate from Facility Storage Tanks				1.58	6.94

The diesel fuel storage tanks used by WMATA and at Denali National Park would be expected to result i low levels of VOC emissions, as shown for diesel fuel storage in Table 4-4.

Within the GTL plant, additional sources of fugitive VOC emissions would result from leaks in process equipment, specifically pipe connections, pipe flanges, pump seals, control valves, and compressors. Approximately 2,800 of these potential sources of fugitive emissions would be included in the proposed facility. Using emission factors developed by EPA (EPA-453/R-95-017), and based on the anticipated service of these items of equipment, the organic carbon emissions from these equipment items would total 10.99 lb/hr, or 48.15 tpy. These values were used by ODEQ to establish the maximum permitted VOC emission level for process equipment.

Combining the emissions from combustion sources, storage tanks, and process equipment, Table 4-5 presents the total annual emissions of air pollutants that would be anticipated from operation of the proposed plant.

Table 4-5. Total Annual Emissions from the Gas-to-Liquids Plant (Tons)

SOURCE	PM_{10}	NO_x	CO	SO_2	VOC
Boiler and Heaters	0.26	3.41	2,87	0.01	0.19
Gas Turbine	0.69	33.29	8.53	0.02	0.22
Vapor Combustor	0	7.82	42.52	0	7.24
Storage Tanks	0	0	0	0	6.94
Fugitive Emissions	0	0	0	0	48.15
TOTAL	0.95	44.52	53.92	0.03	62.74

Since the annual emission rate of each criteria pollutant from plant operation would be less than the threshold level of 100 tpy, as specified in Federal and state regulations for designation as a major emission source, the proposed facility would comply with conditions appropriate for classification as a minor source of emissions, which precludes need for emissions modeling or application of Best Available Control Technology.

Gases that would be collected for processing in the vapor combustor may contain small quantities of ammonia, methanol, pentane, and hexane, which are (low toxicity) toxic air contaminants under Oklahoma law (OAC 252:100-41). EPA also regulates methanol and hexane as Hazardous Air Pollutants. Conservatively, destruction efficiency for organic vapors in the combustor would be at least 98%. The quantity of each of these materials that would be produced in the GTL plant, and thus the level of emissions of toxic air contaminants, would be proportional to the anticipated maximum processing rate for natural gas, which would be about 5,325 lb per hour. Projected emission rates for these toxic air pollutants are shown in Table 4-6.

Table 4-6. Projected Emission Rates of Toxic Air Pollutants from the Proposed Plant

POLLUTANT	EMISSION RATE	
	LB/HR	TPY
Ammonia	3.10	0.27
Methanol	3.06	0.27
Pentane	0.70	3.08
Hexane	0.59	2.57

None of the toxic air pollutants would exceed the *de minimus* threshold level of 6 tpy, or a maximum of 5.6 lb/hr, for regulation under Oklahoma law.

The proposed plant would be in compliance with National Emissions Standards for Hazardous Air Pollutants (NESHAPs). New Source Performance Standards (NSPS), as defined at 40 CFR 60, Subpart Kb, require record keeping pertaining to certain tanks. The proposed facility would comply with the record keeping requirements of Subpart Kb.

4.6 WATER RESOURCES AND WATER QUALITY

4.6.1 Affected Environment

Surface water resources in the area of the proposed plant include the Verdigris River, located approximately 2 miles southeast, and Bird Creek, located approximately 1.5-miles southwest. No surface water impoundments are located on the proposed site. Groundwater resources in the area consist of alluvium and terrace deposits along the Verdigris River. This aquifer is generally unconfined with a saturated thickness of 25 to 70 feet. Water from the aquifer tends to be very hard with dissolved solids concentrations ranging up to 500 milligrams per liter (mg/l).

The Oklahoma Department of Environmental Quality (ODEQ) is authorized by the U.S. Environmental Protection Agency to administer the National Pollutant Discharge Elimination System in Oklahoma. ODEQ regulations require permits for construction activities that disturb more than 5 total acres and include requirements for installation of water or sewer lines. A permit to discharge stormwater from a construction activity must be obtained prior to initiation of any soil disturbance. In addition, a Stormwater Pollution Prevention Plan (SWPPP) for the construction site must be developed. The SWPPP must contain information describing the site, stormwater controls, maintenance, inspections, and non-stormwater discharges.

4.6.2 Environmental Consequences

The proposed plant would not use surface or groundwater sources for domestic, process, or fire water. Potable water for domestic and process operations would be obtained from the City of Tulsa potable water system. Fire water supply would also be obtained from this system. Potable water use by the facility, not including fire flows, would be approximately 10 gallons per minute (gpm) for process operations and domestic water use. Total water usage during the lifetime of the DOE project would be approximately 52,594 barrels (about 2.2 million gallons), with about 5% used for potable water and 95% used for process water. Construction of additional or upgraded mains to supply this volume of water would not be required.

Process water would be collected by a closed-drain system. Water potentially contaminated by hydrocarbons would be processed through a water separator to remove the hydrocarbon species. Process water with a pH below established discharge limits would be processed for pH adjustment in a caustic injection vessel. All process water streams would be combined and tested to ensure compliance with permit requirements prior to discharge.

Wastewater would be discharged to the City of Tulsa sanitary sewer system under a permit for industrial wastewater discharge. Wastewater would be treated by Tulsa's publicly owned treatment works (POTW) prior to final discharge in accordance with the POTW's Oklahoma Pollutant Discharge Elimination System permit. Domestic wastewater would also be disposed using the City of Tulsa POTW. Process and domestic wastewater discharges from operation of the proposed plant to the POTW would be about 6.7 gpm. Over the time duration of the DOE project, a total of about 33,520 barrels (1.4 million gallons) of wastewater would be produced.

During plant construction, stormwater would be managed in accordance with an ODEQ-approved General Construction Permit for Stormwater. A Stormwater Pollution Prevention Plan for Construction activities would be developed and implemented.

A final plan for management of stormwater during GTL plant operation at the proposed site has not been fully defined. Final design of a stormwater management plan would be completed in consultation with the City of Tulsa. A critical factor to be considered in developing the plan is a requirement that, if stormwater contacts process-derived, spilled, or leaked materials (e.g., produced diesel fuel), the water would be prohibited from discharge as stormwater; this water would require treatment and disposal in accordance with wastewater regulations.

During operation, although the plant would be exempt from permit requirements, an internal SWPPP would be implemented. This Plan would incorporate best management practices for stormwater management during plant operation.

Stormwater can be segregated into two categories: runoff that has contacted process areas, and thus has a potential for contamination, or runoff that has not contacted process areas or raw materials. Under current plans, stormwater that does not contact process materials (non-process or non-contaminated stormwater) would be planned for discharge to an unnamed tributary of Bird Creek. This stormwater would flow by natural drainage pathways.

Stormwater that might become contaminated at levels exceeding regulations would be controlled, treated prior to discharge from the site, discharged under a permit with the ODEQ, and monitored. Contaminated runoff could be diverted to the plant's wastewater stream, treated, and undergo disposal into the city sewer as Class II water. Class II water is Oklahoma's classification for water "containing or suspected to contain pollutants for which the toxicity, concentration and volume pose a moderate risk of harm to humans, aquatic life, wildlife, or the environment, either through the potential to migrate in groundwater or a reasonable possibility, if discharged, to degrade the beneficial uses of the receiving water as designated in the Oklahoma Water Quality Standards." The discharge limit into the City of Tulsa's sewer system at the Tulsa Port of Catoosa is 100 mg/l for phase-separated oil and grease and 500 mg/l for dissolved-phase oil and grease.

The proposed plant would not include work that would affect navigable waters of the United States. In addition, the proposed plant would not require discharge or deposit of dredge or fill material into waters of the United States. No Clean Water Act Section 404 or 402 permit would be anticipated for site actions. No requirement for a Section 10 permit under the River and Harbors Act would be anticipated.

4.7 SOLID AND HAZARDOUS WASTE

4.7.1 Affected Environment

The proposed site consists of an undeveloped 10-acrea parcel of land with no current human activity.

4.7.2 Environmental Consequences

Over the 36-month duration of the DOE project, an estimated 8,640 cubic ft of non-hazardous waste would be generated. The average quantity of waste generation per month would be less than 9 cubic yards. Commercial haulers would be used to transport this non-hazardous waste to a public landfill that has been permitted by the City of Tulsa Public Works Department. If, during the course of this project, the monthly quantity of non-hazardous solid waste requiring disposal should exceed 10 cubic yards, the facility operator would prepare and maintain a tracking document for each load of solid waste transported for disposal.

Potentially hazardous wastes would be generated from facility operations. These wastes could include spent catalysts from hydroprocessing, sludges from the oil-water separator, and caustic material used for water treatment. These wastes would be appropriate categorized or characterized for hazard potential. Wastes determined to be hazardous would be temporarily stored at the site in advance of transport for disposal. Disposal of hazardous wastes would be accomplished using a properly licensed hazardous waste hauler for transport to an appropriate disposal site outside the State of Oklahoma.

4.8 NOISE

Sounds that disrupt normal activities or otherwise diminish the quality of the environment are designated as noise. Noise can be stationary or transient, intermittent or continuous. Community response to noise is based on a subjective assessment of the daily noise environment. Factors included in this assessment of noise impacts are the noise levels of individual events, the duration of noise events, and the time of day at which the events occur.

4.8.1 Affected Environment

The proposed plant would be limited, by the land use rental contract with the Tulsa Port of Catoosa, to maximum operational noise levels at the property line of 4 decibels (dB) above background levels or 60 dB, whichever is greater. For reference, 60 dB is approximately the noise level created by two people speaking three feet apart. Noise events within the area proposed for the GTL plant are presently associated with climatic conditions (i.e., wind or thunder), transportation noise (i.e., traffic, highways, railroad lines, or air traffic), and localized activities (i.e., industrial activities at the Port). The insert presents information on typical levels of noise generated by familiar events, along with an identification of health concerns, if any, associated with those noise levels.

A noise survey was completed in August 2001 to assess background noise levels. In addition, a separate noise study was performed in March 2001 to assess potential property line noise levels during operation. The August 2001 survey was conducted on a hot (86°F), relatively calm (winds <10 mph), dry day using a Quest 2900 integrating/logging noise level meter. Recordings were taken at roughly the midpoints of the four sides of the property

Levels of Noise by Type of Event

Loudness of sound is measured in units of decibels (dB); loudness as heard by the human ear is measured on the A-weighted dB scale (dBA). An increase of one dB equals 30% more noise energy; an increase of 10 dB equates to a doubling of the noise energy. Sound levels decrease by about 6 dB for every doubling of distance from the sound source. A few examples comparing familiar noises and their exposure concerns are as follows:

Source*	dB	Concern
Soft Whisper	30	None. Normal safe levels.
Quiet Office	40	
Average Home	50	
Conversational Speech	66	
Busy Traffic	75	May affect hearing in some individuals, depending on sensitivity, exposure duration, etc.
Noisy Restaurant	80	
Average Factory	80-90	
Pneumatic Drill	100	Continued exposure to noise over 90 dB may eventually cause hearing impairment
Automobile Horn	120	
Jet Plane	140	Exposure to noise at or over 140 dB may cause pain
Gunshot	140	

* Noise and You, Channing Bete Co., Inc., South Deerfield, MA, 1985.

boundary, approximately four feet above ground. The time-weighted equivalent (L_{eq}) noise levels (an equivalent noise level calculated from recordings over a 24-hour day) on the property lines bordering the two adjacent Industrial Park properties were 50.8 dB(A) and 51.2 dB(A). The L_{eq} on the property line facing State Highway 266 was 53.6 dB(A), and the L_{eq} on the property line closest to the active railroad track (about 65 ft north of the track) was 58.6 dB(A).

4.8.2 Environmental Consequences

During construction of the proposed plant, noise would be localized, intermittent, and temporary. Short-term impacts may be realized during construction, which would require a maximum time duration of 12 months. Individual construction activities during this time would be completed in substantially shorter times, but could result in noise levels approaching 100 dB at the source.

In March 2001, a noise simulation study was performed at the proposed site to assess the potential impacts of plant operation. Noise level recordings were made for operating equipment comparable to that proposed for use in the GTL plant: gas turbine (107 dB maximum), pumps (88 dB to 93 dB), fans (82 dB), compressor (85 dB), and fired heater (78 dB). The equipment sound recordings, with matching frequencies and decibel levels, were replayed at a location near the southeast corner of the proposed site. Noise measurements made during the replay indicated the following:

- No increase in noise was detected at the hill overlooking the Tulsa Port of Catoosa, to the west of the proposed site
- Near the property line on the north-west side of the proposed site, noise level increased by about 5 dB
- At a point about 300 ft east of the replay equipment, sound level increased from 55-57 dB to 64-66 dB

Reduction in simulated turbine noise from 107 dB to 80 dB resulted in about a 2 dB reduction in overall noise level around the proposed site. Simultaneous reduction in simulated noise levels from the pumps resulted in reduction of overall noise to a level acceptable to Tulsa Port of Catoosa management.

To minimize noise level at the property line, an enclosure or building would be used to house the gas turbine. Other noise generating equipment, such as pumps, compressors, and heaters, would be selected and purchased using a criterion that noise level must be 80 dB or lower at a distance of 4 ft from the equipment. To achieve a maximum noise level of 60 dB at the property line, equipment generating noise levels of 80 dB at 4 ft would require placement of the site at distances of 32 to 64 ft from the property line. If such equipment could not reasonably be located, the equipment would be located in a building or fitted with an enclosure to minimize noise levels.

The proposed plant would be designed to meet the lease requirements limiting property line noise levels to 60 decibels (dB) or 4 dB above background noise levels, whichever is greater.

For the three buses used in each fleet vehicle tests at WMATA and Denali, the improved ignition quality of GTL diesel would be expected to result in reduced engine noise compared to conventionally fueled buses.

4.9 LAND USE

4.9.1 Affected Environment

The proposed 10-acre site for the GTL plant is located within the 2,000-acre Tulsa Port of Catoosa Industrial Park. Parcels of land, typically ranging in size from 5 acres to 150 acres, within the Park are

leased to industrial tenants. Land use provisions and restrictions for leased parcels are legal stipulations contained in lease agreements executed with the Tulsa Port of Catoosa by tenants of the Park. Sections 10 and 3.3.1.2 of this Environmental Assessment provide additional details on existing uses of land in the Industrial Park.

4.9.2 Environmental Consequences

The proposed plant would result in permanent changes to the existing conditions of the 10-acre, undeveloped project site. The woodlands, grasses, and forbs on the site would be substantially replaced by facilities required for the GTL production plant. Changes to the site would be governed by the lease executed with the Tulsa Port of Catoosa and with the reviews and approvals that would be required from the local planning commission prior to initiation of industrial activity. Section 10 provides additional information on reviews and approvals of land uses within the Industrial Park.

4.10 SOCIOECONOMIC SETTING

4.10.1 Affected Environment

The proposed plant location is approximately 3 miles from the central business district of Catoosa, which has a population of approximately 2,950. Catoosa's present expanded location adjoins both Tulsa and Wagoner counties, while the city is located in Rogers County. The city experienced a growth rate of 62.5 percent during the 1990s, making Catoosa one of the fastest growing cities in the region. The 2,000-acre Tulsa Port of Catoosa Industrial Park is situated at Catoosa's northern edge and has operated since 1971. The Industrial Park is currently home to 50 companies employing 2,600 people.

The proposed plant location is 12 miles from central Tulsa, which has a population of approximately 386,000. Tulsa's largest employers cover a multitude of industries, including manufacture of electronic components, aircraft flight training equipment, major household appliances, steel products, aviation and aerospace products, ceramic tile, glass products, petroleum products, and outdoor sporting equipment. In addition, Tulsa's service workforce is engaged in general medical and surgical services, certified air transportation and fleet maintenance, credit card processing, wholesale grocery distribution, educational systems, telecommunications products and services, convenience stores, airline reservations, banking government, operation of satellite systems, military operations, insurance services, retailing of general merchandise, and newspaper publishing.

Total unemployment for the Tulsa Metropolitan Statistical Area is around 3 percent. The service sector employs the greatest share of the workforce, with approximately 31 percent of the total.

Five rural homes and a sub-division containing 58 lots are located within a half-mile radius of the proposed plant site. Of the 58 subdivision lots, seven have initiated or completed construction, and five of the seven lots are occupied. The overall population density in the area is sparse and the estimated population within a half-mile radius is 30 persons.

4.10.2 Environmental Consequences

The proposed plant would have a small beneficial impact on socioeconomics through increases to area employment, with the transfer of 17 jobs and addition of 7 new jobs. Labor requirements for construction and operation of the proposed plant would be obtained from readily available workforce within the surrounding metropolitan areas.

4.11 WETLANDS

The U.S. Army Corps of Engineers (USACE) regulates impacts to jurisdictional "waters of the United States" under the authority of Section 404 of the Clean Water Act (33 USC Section 404 *et seq*.). Jurisdictional "waters of the United States" include all navigable waters, interstate waters, their tributaries, and adjacent wetlands.

Within the plant area, no jurisdictional waters are found, including perennial or intermittent streams, ponds, and wetlands, considered as "other waters" under the Clean Water Act. For the purpose of this EA, the term "wetland" refers to those vegetated areas that are likely to be regulated as a special aquatic site under Section 404 of the Clean Water Act.

Features on National Wetlands Inventory (NWI) maps are classified according to a system developed by the U.S. Fish and Wildlife Service (USFWS). This system is referred to as the Cowardin System, after its principal author, and is used to establish the type of aquatic system being inventoried.

4.11.1 Affected Environment

Reviews of NWI maps from USFWS and a United States Department of Agriculture (USDA) Rogers County soil survey for evidence of wetlands indicated that the proposed plant site would not be located in any area that is depicted as a wetland.

The proposed plant site is densely wooded and currently can be classified as regrowth timber, 10-20 years of age. The site lies within the Oak-Hickory Association-Deciduous Forest Vegetational Region, generally characterized by tall grasses and mixed forbs, with areas of moderate to dense mixed hardwood forest.

The USDA soil survey for Rogers County indicated that the major soil at the proposed plant location is the Dennis-Bates complex (refer to Section 4.2.1.1). This soil is not classified by the USFWS as a hydric soil and does not support wetland environments. Soil conditions are not conducive to slow draining, and vegetative conditions or reducing conditions resulting from prolonged saturation are not normally present.

A field visit was conducted in August 2001 by URS Corporation, a contractor hired to provide environmental support, to evaluate the potential for occurrence of site ecological receptors in the area proposed for the GTL plant. No areas that exhibited wetland criteria (i.e., vegetation, hydric soil, and hydrology) were identified.

4.11.2 Environmental Consequences

For the purpose of this EA, the potential for existence of wetlands was evaluated using NWI maps and a site survey. Neither the field visit nor research of available information revealed wetlands, or indications of wetlands, on the plant site.

4.12 FLOODPLAINS

4.12.1 Affected Environment

The proposed site is generally situated on the broad floodplain of the Verdigris River, but the project site is not within either the 100-year or the 500-year floodplain.

4.12.2 Environmental Consequences

Activities associated with the proposed plant would not be expected to impact or be impacted by either a 100-year or a 500-year flood event.

4.13 BIOLOGICAL RESOURCES

4.13.1 Affected Environment

The proposed plant site is located in the Central Irregular Plains ecological region. The Central Irregular Plains are characterized by a mix of land use types and tends to be topographically irregular. The natural vegetation of this ecological region is a grassland/forest mosaic with wider forested strips along streams.

On August 29, 2001, URS contacted the Tulsa office of the USFWS to identify any location or potential locations for endangered species in or near the plant site. The USFWS indicated that no crucial wildlife habitats, current Federal or state-listed threatened or endangered species, designated critical habitat, species in need of conservation, or public recreation areas are located within the plant site. A subsequent contact with the USFWS by DOE confirmed this conclusion.

Section 11 and Appendix A of this Environmental Assessment provide additional details regarding the USFWS contacts.

The listed species of Rogers County, Oklahoma, along with a description of their habitat, are identified below.

4.13.1.1 Federal Threatened & Endangered Species

- Interior Least Tern – Interior least terns favor islands or sandbars along large rivers for nesting. The sand must be mostly clear of vegetation, and least terns prefer shallow water for fishing. Water levels must be low enough so that nests stay dry.
- Whooping Crane – Whooping cranes inhabit marshes and prairie potholes in the summer. In winter, they are found in coastal marshes and prairies.
- Bald Eagle – Bald eagles require large trees or cliffs near water with abundant fish for nesting. They winter along oceans, rivers, lakes, or in areas where carrion is present.
- Piping Plover – Piping plovers nest on sandy beaches bordering oceans or lakes. Along rivers, piping plovers use the bare areas of islands or sandbars for nesting. They also nest on the pebble mud of interior alkali lakes and ponds. During the winter, piping plovers use algae, mud, and sand flats along the Gulf Coast. Spoil islands in the Intracoastal Waterway are also used.
- Western Prairie Fringed Orchid – This prairie wildflower is known to occur in seven states and one Canadian province. The orchid occurs most often in remnant native prairies and meadows, but has also been observed at disturbed sites.
- Arkansas Darter – This small, colorful Arkansas darter lives in shallow, cool, clear spring-fed pools and creeks with sandy bottoms and abundant vegetation. They are intolerant of silty accumulations.
- Neosho Mucket – The Neosho mucket is a freshwater mussel that is endemic to the upper Arkansas River system in northeast Oklahoma and in neighboring areas of Kansas, Missouri, and Arkansas. The Neosho mucket helps stabilize river and stream bottoms, provides a food source for fish, turtles, muskrats, raccoons, otters, and other species, and feeds on algae and plankton, leaf litter, and other suspended particles, thus serving as a water filter.

4.13.1.2 State Threatened & Endangered Species

- Texas Horned Lizard (horn toad) – Texas horned lizards require dry, sandy areas with little vegetation.

URS personnel visited the proposed plant location on August 30, 2001. The purpose of the field visit was to evaluate the potential occurrence of site ecological receptors and critical habitat areas for species of concern in Rogers County, Oklahoma.

No Federal or state listed endangered species were observed in the plant area or the immediate vicinity. Suitable habitat required for the listed species was not observed. Animal species that were observed during the field visit included chickadees, tufted titmice, a downy woodpecker, turkey vultures, blue jays, a three-toed box turtle, and five-toed skinks.

4.13.2 Environmental Consequences

4.13.2.1 Wildlife

Impacts to wildlife from removal of site vegetation, project operation, and potential future demolition would include a decrease in any existing population of smaller, less mobile animals. Wildlife species that would be impacted are common to rural environments of Oklahoma, and the limited habitat destruction at the proposed site would not be expected to affect the viability of regional populations.

4.13.2.2 Vegetation

The majority of the area potentially affected by construction of the proposed plant would be woodlands that are 20 years old or less. Damage or losses of vegetation as a result of constructing the proposed GTL facility would not affect the viability of regional populations.

4.13.2.3 Threatened and Endangered Species

None of the species listed in the Oklahoma Natural Heritage Inventory or County Lists of Federally Listed Species of Oklahoma for Rogers County were observed in the plant area or immediate vicinity. Furthermore, consultation with the USFWS confirmed that no threatened or endangered species are located in the area. Construction of the proposed plant would not remove habitat that would support the threatened and endangered species listed for Rogers County, and thus construction would have no potential impact on the listed species. Copies of consultation correspondence with the USFWS are provided in Appendix A.

4.14 HISTORIC AND CULTURAL RESOURCES

4.14.1 Affected Environment

The Oklahoma Archeological Survey and Oklahoma Historical Society were contacted to identify properties of historic or cultural significance in the plant area. Copies of these contact letters are included in Appendix A. No historic or culturally significant properties were listed for the plant area.

Cojeen Archeological Services (Cojeen) of Norman, Oklahoma, performed a cultural resources survey of the proposed plant location in March 2001 by. Pedestrian transects at 50 ft spacing, augmented by shovel testing, were utilized as field methodology. No historic or prehistoric cultural resources were observed during the course of the survey, and archaeological clearance was recommended. The survey report also recommended that the State Archeologist and State Historical Preservation Office (SHPO) should be

contacted and that construction activities should be halted f any subsurface archaeological materials should be observed during construction.

4.14.2 Environmental Consequences

Contacts with the Oklahoma Archeological Survey in 2001 and in January 2002 confirmed that no sites of archaeological significance are listed in the proposed plant area. An archaeological field inspection indicated that the proposed plant would not affect either archaeological or cultural resources.

The Oklahoma SHPO indicated that the proposed plant would appear to have no impact upon any historic properties that would meet the criteria for listing on the National Register of Historic Places (NRHP). However, based on the topographic and hydrologic setting, archaeological materials could potentially be encountered during excavations. Section 11 and Appendix A of this Environmental Assessment provide additional information regarding those contacts.

Construction of the proposed plant would result in clearing and grubbing of the site and excavation of surface soils. As a result, archaeologic al resources could be encountered. In the event that archaeological resources should be encountered during construction, excavation activities would cease until the significance of the resources has been determined, and appropriate mitigation measures, as identified by the State Archeologist and SHPO, would be implemented.

4.15 NATIVE AMERICAN CONCERNS

The proposed plant site is not located on tribal lands and does not adjoin tribal lands. The Cherokee Nation was consulted regarding development of the site. A proposed SWPPP for construction activities was prepared and submitted to the Cherokee Nation in Tahlequah, Oklahoma, for review. The Cherokee Nation had no objection to the SWPPP or to plans for developing the site. Correspondence from the Cherokee Nation, as provided in Appendix A of this Environmental Assessment, documents this position. The Cherokee Nation did not indicate the presence of Native American Concerns at the proposed plant location. Finally, the Cherokee Nation urged that all applicable rules, regulations, and best management practices be followed.

The Oklahoma Archeological Survey indicated the potential for archaeological material to be encountered during excavations. These archaeological materials could include evidence of Native American habitation. Appropriate controls would be established during site development to determine the significance of any uncovered cultural resources, and the approach to project implementation that was emphasized by the Cherokee Nation would be applied.

4.16 TRAFFIC AND TRANSPORTATION

4.16.1 Affected Environment

4.16.1.1 Tulsa Port of Catoosa Site

A service road along the City of Tulsa's raw water line currently provides access to the site. This service road connects to an asphalt-paved road near the north entrance to the Port, approximately one-quarter mile east of the location of the proposed plant. Approximately 2,600 employees access the Port on a daily basis.

4.16.1.2 Bus Fleet Tests at WMATA and Denali National Park Sites

The proposed project would provide for fleet vehicle tests using three buses in each of the fleets operated by WMATA and at Denali National Park. Currently, these buses operate using conventional diesel fuel with the following EPA-mandated specifications:

- Sulfur content of 500 parts per million (ppm) or less
- Cetane index at least 40
- Aromatics content of 35% (maximum) by volume

The bus fleet at Denali National Park consists of about 100 school buses, and three of these buses would be used for testing GTL diesel fuel. Operation of these three buses would be compared with operation of three other buses that use conventional diesel fuel typical of normal fleet operations. Data on all six buses in each fleet would be obtained to determine the suitability of the GTL fuel for the types of service typically provided by the two bus fleets. The additional tank used for fueling buses with GTL diesel would exist in the same bus service area as the tanks currently used for refueling with conventional diesel fuel. Buses using the GTL fuel would be refueled at approximately the same intervals as the other buses performing the same types of service.

The WMATA bus fleet consists of about 1,440 transit buses that operate from about six depots or terminals around the Washington, D.C., area. Three buses from the Landover, MD, depot would be operated on GTL diesel fuel. Operation of these buses would be matched with and compared with operation of three other Landover-based buses that use conventional diesel fuel. Data would be collected on all six buses to determine the suitability of the GTL fuel for the type of service that the buses typically provide. The GTL fuel tank used at Landover would comprise an existing tank located in the same bus-service area containing the conventional diesel fuel tanks currently used. The buses using GTL diesel would be refueled at approximately the same internals as the other buses performing the same types of service.

New EPA standards for diesel fuel will become effective starting June 1, 2006, for any motor vehicle diesel fuel that is produced or imported. A phase-in period between 2007 and 2010 is provided in the regulations for engine manufacturers. The new regulations will impose requirements for a reduction in sulfur content of diesel for heavy duty trucks and buses to a level of 15 ppm or less.

4.16.2 Environmental Consequences

4.16.2.1 Tulsa Port of Catoosa

The existing service road would be paved to provide permanent site access. Traffic to and from the plant would proceed by this planned road improvement. The GTL plant would employ 24 persons scheduled over three shifts. Employees would use existing roads within the Port prior to the access road. No other transportation improvements, such as road expansions, turn lanes or traffic signals, would be required by the project. The incremental addition of vehicle traffic to serve the needs of the proposed plant would not be expected to be noticeable.

Construction of the proposed GTL plant would require movement or on-site transportation of construction materials, equipment, and construction workers. Transportation needs for plant construction would be intermittent and relatively short duration, due to the anticipated 12-month construction schedule. Operation of the proposed plant would require on-site transportation of hydrogen and nitrogen gas as well as water treatment chemicals and caustic. Additional raw materials for the proposed plant would consist of natural gas, which would be obtained from an existing, nearby pipeline, and water, which would be obtained from existing City of Tulsa water lines.
Products to be transported from the plant site would consist of synthetic fuels, both diesel and naphtha, as well as waste materials, including trash. The proposed plant would produce (nominally) 70 barrels per

day (bpd), or 2,940 gallons per day (gpd), of ultra-clean synthetic fuels. Waste materials would be transported from the site using existing, licensed transporters; current operations by other tenants at the Tulsa Port of Catoosa would be expected to require use of transporters for similar waste materials. Transportation of synthetic fuels would be accomplished using standard, approved containers. Transportation of the final product and project wastes would be performed in accordance with all applicable state and Federal regulations and requirements.

4.16.2.2 Bus Fleet Tests at WMATA and Denali National Park

The proposed project would result in testing ultra-clean diesel fuel in 6 buses from the fleets operated by WMATA and at Denali National Park. This diesel fuel would contain the following specifications:

- Sulfur content less than 1 ppm
- Cetane index at least 70
- Aromatics content essentially zero

Tests have been conducted using ultra-clean, GTL diesel in an unmodified light-duty diesel engine. In addition to essentially eliminating emissions of sulfur oxides, the tests demonstrated emission reductions of 46% for carbon monoxide, 38% for hydrocarbons, 30% for particulates, and 8.3% for nitrogen oxides. Operation of the three buses using GTL diesel in both the WMATA and Denali bus fleets would be expected to achieve comparable reductions in emissions.

The GTL diesel fuel used in the buses would replace conventional diesel fuel usage. No increase in bus daily mileage would result.

4.17 SAFETY AND HEALTH

4.17.1 Affected Environment

No industrial or commercial activities currently occur on the 10-acre parcel of land proposed for the GTL plant. Site security for tenants at the Industrial Park is provided by the Tulsa Port of Catoosa. Entrance roads to the Park are gated with controlled access and after-hours security.

4.17.2 Environmental Consequences

Safety and health for workers involved in construction and operation of the proposed GTL plant would be substantially governed by compliance with regulations established pursuant to the Occupational Safety and Health Act.

Some materials to be used and produced during operation of the proposed plant would possess hazard characteristics. The ultra-clean diesel fuel to be produced by the facility would be characterized as a hazardous material due to its volatility (i.e., flash point below 140^{O}F). Naphtha produced by the facility would be characterized as a hazardous material for the same reason. These fuel products would be retained and used in engine and fleet vehicle tests. Small quantities that would remain from activities such as analytical testing would eventually undergo disposal in accordance with applicable waste disposal regulations. Fuel products would be stored in tanks or approved containers with appropriate containment for accidental releases. In addition, a Spill Prevention, Control, and Countermeasures Plan would be developed and applied for protection against adverse impacts from spills of chemical materials.

Hydrogen gas that would be consumed in the GTL plant would be purchased, delivered, and stored in high-pressure tube trailers. Tube trailer supplies of hydrogen provide a common method for industrial users to procure and store hydrogen for use.

Caustic used for water treating would possess health hazards. Supplies would be stored in approved containers, but hazard potential would exist during caustic material handling. Safeguards (e.g., eye protection, etc.) would be used to ensure worker safety.

For the GTL plant, since operations would involve handling and processing of combustible gases (natural gas and hydrogen), safeguard protections against flames and other spark ignition sources would be established. Process operations would substantially be open to the atmosphere, thus minimizing potential for gas build-up in stagnant or confined areas.

Plant workers would be required to use hearing protection in areas with noise levels exceeding 87 dB. An employee protection program including regulatory training and both equipment and operations training would be established to protect plant workers. Personal protective equipment for employee use would include safety glasses, hard hats, fire retardant clothing, and hearing protection.

In the event of an accident, the Tulsa Port of Catoosa maintains a full service occupational health clinic, complete with helipad and staffed by an affiliate of St. John Hospital.

4.18 POLLUTION PREVENTION

Materials usage would be minimized, to provide only for the essential needs of the GTL plant. During plant construction, topsoil would be stockpiled and used for final landscaping and contouring. During operation, stormwater would be managed to minimize runoff that could potentially become contaminated in process areas, and stormwater that does contact potentially contaminated process areas would be collected and appropriately treated for oil separation and pH adjustment prior to discharge. To the extent possible, used catalysts would be transported for recycle or recovery of reusable materials.

4.19 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires Federal Agencies to identify and address disproportionately high and adverse human health or environmental effects on minority or low-income populations resulting from their actions. Table 4-7 presents demographic information for considering environmental justice concerns.

Table 4-7. Comparison of Demographics for Geographic Are as in 2000

CHARACTERISTIC	GEOGRAPHIC AREA		
	USA	OKLAHOMA	ROGERS COUNTY
Population under 5 years	6.8%	6.8%	6.9%
Population over 65 years	12.4%	13.2%	11.3%
White persons	75.1%	76.2%	79.9%
Black persons	12.3%	7.6%	0.7%
Native American persons	0.9%	7.9%	12.1%
Asian persons	3.6%	1.4%	0.3%
Hispanic or Latino persons	12.5%	5.2%	1.8%
Population change, 1990-2000	13.1%	9.7%	28%
Median household income	$37,005	$30,002	$41,466
Persons below poverty	13.3%	16.3%	9.1%
Children below poverty	19.9%	23.7%	14.1%

As shown in the Table, the demographics of Rogers County indicate an area of relatively high population growth since 1990 and an area of relatively high household income. Poverty levels of individuals and children in Rogers County are substantially lower than levels for the U.S. and Oklahoma. The one population segment for Rogers County that displays a distinctly high characteristic that must be considered is the population of Native Americans. The Cherokee Nation is the predominant Native group in this population. Section 4.15 discusses consultations with the Cherokee Nation regarding the proposed development of the Tulsa Port of Catoosa site for the GTL plant, which resulted in this Native American group providing documentation of no objections.

The proposed plant is considered to represent an activity that would not result in any disproportionate adverse impact to low-income or minority populations.

4.20 UNAVOIDABLE ADVERSE EFFECTS

The proposed plant could result in short-term to long-term impacts to the site. Many of the potential adverse impacts described in the preceding sections would be avoided as part of the planning for the proposed project or have a remote chance of occurring. However, potential impacts could occur, and the following list of primary unavoidable impacts would be anticipated:

- Increase in noise levels during construction (short duration), operation, or demolition
- Potential short-duration increase in airborne dust and particulate during construction or demolition and a similar localized, but permitted, increase in air emissions during operation
- Loss of biological resources from localized destruction of site woodlands during construction, which would be an unavoidable long-term effect of the proposed project